

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

HATTORI et al.

Application No. Unassigned

Filed: February 15, 2002

For: STATE-OF-DEVICE REMOTE
MONITOR SYSTEM

Art Unit: Unassigned

Examiner: Unassigned

PENDING CLAIMS AFTER ENTRY OF PRELIMINARY AMENDMENT

1. A state-of-device remote monitoring system comprising:
an on-the-spot area; and
a management area,
said on-the-spot area including:
an electric device;
a detector for detecting a device state of said electric device;
a first communication signal converter for converting detection data obtained
by detection of said detector into communication signals, and transmitting the communication
signals; and
a controller, having a memory for storing the detection data obtained by the
detection of said detector, for storing with the detection data the device state based on a
preset detection start program, and outputting the detection data stored in said memory to said
first communication signal converter based on a preset communication start program that
runs in correspondence with storage of the detection data, and
said management area including:
a second communication signal converter for converting the communication
signals received from said first communication signal converter into the detection data
before;
a maintenance tool having a diagnostic/analytic program for analyzing the
device state from the detection data converted by said second communication signal
converter, and a maintenance database storing data necessary for analysis by said
diagnostic/analytic program and a diagnosed result; and
a display unit for displaying the diagnosed result obtained by the analysis by
said maintenance tool.

2. The state-of-device remote monitoring system according to claim 1, further comprising a general purpose network for transmitting the communication signals transmitted from said first communication signal converter to said second communication signal converter.

3. The state-of-device remote monitoring system according to claim 1, wherein said first communication signal converter converts the detection data into radio signals and transmits the radio signals, and
said second communication signal converter converts the radio signals received from said first communication signal converter into the detection data.

4. The state-of-device remote monitor system according to claim 2, wherein said on-the-spot area includes a mobile communication device for transmitting the radio signals based on the communication signals converted by said first communication signal converter, and
said general-purpose network includes:
at least one base station for receiving the radio signals of said mobile communication device and converting the radio signals into the communication signals; and
a mobile communication network for transferring the communication signals converted by said base station to a public line network.

5. The state-of-device remote monitoring system according to claim 1, further comprising:
a power line for supplying said electric device with electric power from a power source device; and
connecting means for connecting said power line, said controller, and said first communication signal converter to each other, said controller transmitting the detection data to said first communication signal converter via said connecting means and said power line.

6. The state-of-device remote monitoring system according to claim 5, further comprising:
a current transformer, provided on said power line, for taking an electric current in a non-contact manner from said power line; and
a power source circuit for supplying the electric power to said controller based on the current taken by said current transformer.

7. The state-of-device remote monitoring system according to claim 1, wherein when said on-the-spot area is within a train including a train radio device for adjusting a traffic

schedule, the detection data stored in said memory are wirelessly transmitted to said second communication signal converter from said train radio device by use of said train radio device as said first communication signal converter.

8. The state-of-device remote monitoring system according to claim 2, wherein, if said on-the-spot area is within an automobile, comprising:

a mobile record terminal downloaded with the detection data stored in said memory by connecting a communication cable, disconnectable from and connectable to said first communication signal converter; and

a mobile communication device, connected to said mobile record terminal, for converting the detection data downloaded into said mobile record terminal into the radio signals and transmitting the radio signals, wherein said general-purpose network includes at least one base station for receiving and converting the radio signals of said mobile communication device into the communication signals, and including

a mobile communication network for transferring the communication signals converted by said base station to a public line network.

9. The state-of-device remote monitoring system according to claim 1, wherein, when said on-the-spot area is within an electric car including a battery for supplying electric power, the system comprises:

a power source/communication cable disconnectable from and connectable to said battery, connected to a power source; and

a power control device for charging said battery with electricity from said power source device by connecting said power source/communication cable to said battery, downloading the detection data stored in said memory, and transferring the detection data to said general-purpose network.

10. The state-of-device remote monitoring system according to claim 2, wherein said controller does not include said memory, detects a device state through said detector based on a preset detection start program if a communication route between said first communication signal converter and said general-purpose network is established, and outputs the detection data to said first communication signal converter based on a preset communication start program in accordance with the device state detected.

11. The state-of-device remote monitoring system according to claim 1, wherein said maintenance tool outputs a state-of-device detection start command of the electric device to said controller at a predetermined time, and

said controller executes the detection start program based on the state-of-device detection start command.

12. The state-of-device remote monitoring system according to claim 1, wherein if said controller detects the device state through said detector with a fixed period, said maintenance tool outputs to said controller a command to change detection period of said detector in accordance with a diagnosed result from the detection data based on a preset program, and

said controller detects the detection data from said detector with the detection period changed, based on the command to change the detection period.

13. The state-of-device remote monitoring system according to claim 1, further comprising a mobile communication device for issuing abnormality information upon receiving the abnormality information, wherein said maintenance tool transmits, if the diagnosed result from the detection data shows an abnormality, the abnormality information to said mobile communication device.

14. The state-of-device remote monitoring system according to claim 13, wherein said maintenance tool includes a maintenance procedure database storing maintenance procedure data corresponding to a variety of abnormal states, extracts the maintenance procedure data corresponding to the abnormal information from said maintenance procedure database if the diagnosed result from the detection data shows the abnormality, and transmits the extracted maintenance procedure data together with the abnormality information to said mobile communication device.

15. The state-of-device remote monitoring system according to claim 1, further comprising a user maintenance terminal connected to said general-purpose network and issuing the data received via said general-purpose network, wherein said maintenance tool is managed by an in-charge-of-maintenance company in charge of monitoring device state of the electric device and outputting the diagnosed result, based on said diagnostic/analytic program, to said maintenance terminal.

16. The state-of-device remote monitoring system according to claim 15, wherein said maintenance tool includes a device database storing device specifications of a variety of electric devices, and a maintenance procedure database storing maintenance procedure data corresponding to a variety of abnormal states, and outputs to said maintenance terminal the device specification corresponding to an electric device analyzed and the maintenance

procedure data corresponding to the diagnosed result together with the diagnosed result based on said diagnostic/analytic program.

17. The state-of-device remote monitoring system according to claim 15, wherein said mobile communication device is possessed by a maintenance worker of the in-charge-of-maintenance company in charge of monitoring the device state of the electric device,

said maintenance tool is managed by the in-charge-of-maintenance company and includes:

a position database storing position of said mobile communication device; and
a maintenance worker invoked program for extracting, if the diagnosed result based on said diagnostic/analytic program shows the abnormality, said mobile communication device closest in position to the electric device diagnosed abnormal, based on said position database, and calling said mobile communication device.

18. The state-of-device remote monitoring system according to claim 17, wherein said maintenance tool includes a device database storing device specifications of a variety of electric devices, and a maintenance procedure database storing plural items of maintenance procedure data corresponding to a variety of abnormal states, and said maintenance worker invoked program calls said mobile communication device and provides said mobile communication device for the maintenance worker with the device specifications corresponding to the electric device diagnosed abnormal and the maintenance procedure data corresponding to the abnormal state.

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